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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/663,021	09/15/2000	Kai Yang	D412	1824

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EXAMINER
CLARK, SHEILA V

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 09/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/663,021	Yang et al
Examiner	**Art Unit**
Sheila V.Clark	2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *three* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jun 13, 2003* .

2a) ☒ This action is **FINAL.** 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-20* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). *13*
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-5, 19, 20 are rejected under 35 U.S.C. 102(a) as being anticipated by Liao

Liao shows a first barrier layer 206 disposed in a channel opening of a dielectric layer 202, a conductive material 208 is shown disposed in said barrier layer in said channel opening and is shown recessed within said channel. A second barrier layer 212 disposed in said first barrier layer and over said conductive layer. The material recited in the claims are further taught by Liao l (see col. 1, lines 26-27, col. 3. lines 55-56, col. 2, line 23-24)

Claims 7-11, 13-18 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Liao.

Liao shows a first barrier layer 206 disposed in a channel opening of a dielectric layer 202, a conductive material 208 is shown disposed in said barrier layer in said channel opening and is shown recessed within said channel. A second barrier layer 212 disposed in said first barrier layer and over said conductive layer. The material recited in the claims are further taught by Liao (see col. 1, lines 26-27, col. 3. lines 55-56, col. 2, line 23-24). The steps of providing, forming, removing and depositing are deemed to be inherently taught by Liao et al.

Liao describes in col. 2 that the first barrier layer 206 is deposited in the channel opening and on the dielectric layer 202 and the first metal layer is formed thereon. The layers are removed and layer from the dielectric layer and therefore obviously removed from outside the opening.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 12, are rejected under 35 U.S.C. 103(a) as being unpatentable over Liao.

The claims from which claims 6, 12, depend have been discussed above except for the first and second barrier layer formed of the same thicknesses.

As Liao fails to express a particular thickness of the second barrier layer and therefore suggests use of a range of conventional thicknesses. The ordinary artisan would have been motivated to modify Liao because Liao silence relative to thickness appears to suggest that conventional methods may be utilized which make said layers of the same thickness.

Claims 19 and 20 in so far as understood are rejected under 35 U.S.C. 102(a) as being anticipated by Liao.

Liao shows a first barrier layer 28 disposed in a channel opening of a dielectric layer, a conductive material 29 disposed in said barrier layer in said opening and an interconnect barrier layer 34 disposed over said layers and totally enclosing said conductive material. Said

interconnect layer 15 is shown below the surface of the device and therefore recessed below the surface in the channel.

The claims contain method of making characteristics (i.e. self aligned) given no patentable weight in determining the patentability of the final device structure.

Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao 190 USPQ 15 at 17(footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessman, 180 USPQ 324; In re Avery, 186 USPQ 161 and In re Marosi et al, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in "product by process" claims, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not.

Claims 1-4 are rejected under 35 U.S.C. 102(a) as being anticipated by Besser et al.

Besser et al shows a first barrier layer 11 disposed in a channel opening of a dielectric layer, a conductive layer 12 disposed in said barrier layer and recessed in said opening and a second barrier layer 15 disposed over said layers and totally enclosing said conductive layer. The material recited in the claims are further taught by Besser et al et al.

Claims 19 and 20 in so far as understood are rejected under 35 U.S.C. 102(a) as being anticipated by Besser et al.

Besser et al shows a first barrier layer 11 disposed in a channel opening of a dielectric layer, a conductive material 12 disposed in said barrier layer and recessed in said opening and an interconnect barrier layer 15 disposed over said layers and totally enclosing said conductive material. Said interconnect layer 15 is shown below the surface of the device and therefore recessed below the surface in the channel.

The claims contain method of making characteristics (i.e. self aligned) given no patentable weight in determining the patentability of the final device structure.

Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao 190 USPQ 15 at 17(footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessman, 180 USPQ 324; In re Avery, 186 USPQ 161 and In re Marosi et al, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in "product by process" claims, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not.

Claims 1-20 are rejected.

Applicant's arguments filed 6-13-2003 have been fully considered but they are not persuasive. The conductive materia recessed in the channel newly recited is deemed to be clearly taught by the reference relied upon in the rejection as well the associated recited features.

Also even with the above noted changes the references relied upon in the rejections are deemed to clearly teach the second barrier formed in the channel and the conductive layer being fully encased in metal. This seems to be well taught by the prior art.

As discussed with the applicant on the interview of December 10th, barrier caps formed in trenches of damascene structures are very popular and this feature as recited in the claims of the instant invention appears reflect said popularity.

Besser is deemed to clearly show conductive material 12 recessed or indented from the top surface of the substrate and formed in barrier layer 12. Applicant appears to argue that the method of making utilized by Besser fails to produce a recessed layer which fails to be germane to the issues. The term " recessed" by Marian Webster Dictionary is taken to mean an indentation.

The term used in the claims is being perceived from the structural definition of a recess which all the references used in the rejections clearly show.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner S.V. Clark whose telephone number is (703) 308-4924. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee , can be reached on (703) 308-1690. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722 or 7724. Any inquiry of a general nature

or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956

August 23, 2003